

# Generic FMS Platform for Evaluation of Autonomous Trajectory-Based Operation Concepts, Phase II

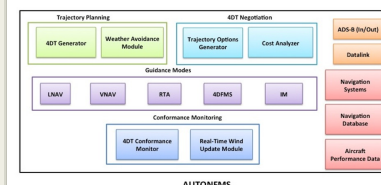
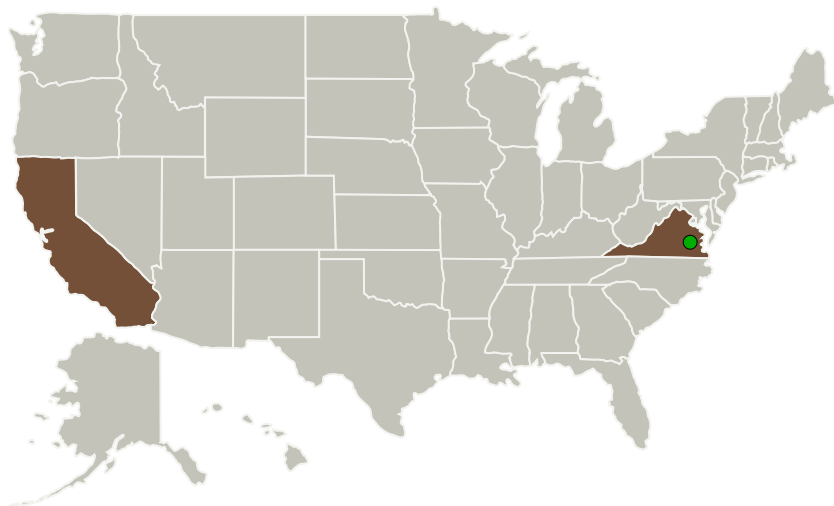
Completed Technology Project (2016 - 2018)



## Project Introduction

The objective of the Phase II work is to develop a generic, advanced Flight Management System (FMS) for the evaluation of autonomous 4D-trajectory based operations (4DTBO) concepts. The work will address the following limitations of most commercially available FMS: they have limited advanced features; are specific to a single aircraft type; and cannot be readily modified by researchers. The proposed research will identify and extend advanced FMS features for the simulation evaluation of 4DTBO concepts in different phases of flight, based on the feasibility demonstration during Phase I work. Some of proposed feature include (i) advanced 4D guidance modes such as Required Time of Arrival (RTA), 4DFMS, and Interval Management (IM), (ii) high-fidelity wind modeling and wind update capability for improved predictability, (iii) trajectory negotiation, (iv) optimal 4D trajectory planning. Phase II work will develop a generic FMS interface to NASA's Multi-Aircraft Control System (MACS) to enable the evaluation of FMS modules from multiple vendors in 4DTBO simulations. The proposed FMS platform and the generic FMS interface will allow the users to deploy a wide array of autonomy enabling FMS features through a Graphical User Interface. All the algorithms and software developed under this research will be delivered to NASA at the end of the project.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Optimal Synthesis, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

## Primary U.S. Work Locations

California	Virginia
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## Project Transitions

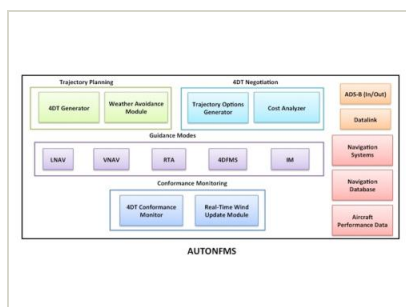
▶ **June 2016:** Project Start

✓ **June 2018:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139863>)

## Images



## Briefing Chart Image

Generic FMS Platform for  
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(<https://techport.nasa.gov/image/134592>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Optimal Synthesis, Inc.

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Principal Investigator:

Padmanabhan K Menon

## Co-Investigator:

P. K Menon

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## Technology Maturity (TRL)

Start: **3**  
Current: **6**  
Estimated End: **6**



## Technology Areas

### Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - └ TX11.3 Simulation
    - └ TX11.3.3 Model-Based Systems Engineering (MBSE)

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System